


PIV analysis

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 An abbreviated version of this protocol was published in Science Advances in Apr 2020

Symmetry breaking in hydrodynamic forces drives meiotic spindle rotation in mammalian oocytes

DOI: 10.1126/sciadv.aaz5004

Detailed protocol

Dear Yunan,

Thanks for your interest. Please refer to the following protocol. Especially, step 1 is quite important. Please always do this step before PIV analysis.

1. Transmitted light images were preprocessed first by alignment using the Image Stabilizer plugin written for ImageJ.
2. We used the PIVlab [1,2] software to track the cytoplasmic flow. The specific parameters were as follows: CLAHE window size, 20 pixels; high-pass filter size, 16 pixels; algorithm, fast Fourier transform window deformation; pass 1 interrogation area, 50 pixels (step: 25); pass 2 interrogation area, 25 pixels (step: 13); window deformation interpolator, linear; subpixel estimator, Gauss 2 × 3 point. After flow analysis, outliers were adjusted using the vector validation function.
3. After obtaining a series of instant velocity fields, we calculated mean flow field by averaging the consecutive frames to obtain a time-averaged vector plot and normalized vorticity by the maximum to denote the orientation of the flow.
4. To extract mean vorticity in specified area, the PIVlab draw tool was used to create ROIs. Using the Extracting Parameters from Area in the Extractions menu of PIVlab, the Area Mean Value for the Vorticity (1 per frame) parameter was obtained.

1. <https://pivlab.blogspot.com/>

2. <https://www.mathworks.com/matlabcentral/fileexchange/27659-pivlab-particle-image-velocimetry-piv-tool-with-gui>

How to cite: (Readers should cite both the Bio-protocol preprint and the original research article where this protocol was used)

1. Wang, H. (2021). PIV analysis. Bio-protocol Preprint. bio-protocol.org/prep979.
2. Wang, H., Li, Y., Yang, J., Duan, X., Kalab, P., Sun, S. X. and Li, R. (2020). Symmetry breaking in hydrodynamic forces drives meiotic spindle rotation in mammalian oocytes. Science Advances 6(14). DOI: [10.1126/sciadv.aaz5004](https://doi.org/10.1126/sciadv.aaz5004)

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